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New records of four *Lecanora* species from China

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Abstract — New records of four lichen species from China, *Lecanora cinereocarnea*, *L. dispersogranulata*, *L. opiniconensis,* and *L. perflexuosa,* are reported. Photos of their thalli are provided.

Key words — *Lecanoraceae*, Asia, taxonomy

Introduction

The lichen genus *Lecanora (Lecanoraceae)* was originally established by Acharius (Luyken 1809). It is a heterogeneous assemblage of different groups, several of which probably deserve generic rank (Lumbsch et al. 2004). The *Lecanora subfusca* group, which is the core group, is characterized by the presence of oxalate crystals in the amphithecium and the production of atranorin and/or usnic acid in the cortex (LaGreca & Lumbsch 2001). Species in the *Lecanora coronulans* group are similar to the *L. subfusca* group but differ in having a pigmented hypothecium (Lumbsch et al. 1996). Some groups differ from the *L. subfusca* group in chemistry. For example, the *Lecanora dispersa* group is characterized by a secondary chemistry that usually contains xanthones but lacks atranorin, an endolithic (sometimes epilithic) white thallus, apothecia with mostly white or light-coloured rims, and by usually calcareous substrates (Fröberg 1997). The *Lecanora varia* group is well characterized by an usnic acid primary chemistry and the lack of atranorin (Śliwa & Wetmore 2000). Also included in *Lecanora* is the subgenus *Placodium*, characterized by rosulate to lobate squamulose thalli that lack atranorin but usually have usnic acid in the upper cortex and lack oxalate crystals in the amphithecium (Ryan et al. 2004).

During our study of *Lecanora* in China, an unreported species belonging to subgenus *Placodium* — *Lecanora opiniconensis* — was discovered. At the same time we found three other new records that belong to *L. subfusca* group: *L. cinereocarnea*, *L. dispersogranulata,* and *L. perflexuosa*.

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Material and methods

The specimens examined are preserved in SDNU (Lichen Section of Botanical Herbarium, Shandong Normal University). A stereo-microscope (COIC XTL7045B2) and a polarizing microscope (OLYMPUS CX41-32) were routinely used for the morphological and anatomical studies on all materials. Photos of the thalli were taken with an OLYMPUS SZX12 with DP70. The chemical constituents were identified using thin layer chromatography (TLC) (Culberson 1972).

The new records

1. *Lecanora cinereocarnea* (Eschw.) Stizenb.,
Ber. Thätigk. St. Gall. Naturw. Ges. 1889–90: 218 (1890) FIGURE 1A

Thallus yellowish gray, continuous, rough to verruculose, margin definite, prothallus white. Apothecia abundant, usually crowded, sessile, at first concave becoming flat, 0.4–1.7 mm in diam.; discs brownish yellow, epruinose; margins concolorous with the thallus, thick, smooth to verrucose. Amphithecium: cortex distinct, gelatinous, containing large crystals insoluble in KOH. Epihymenium brown, with coarse granules soluble in KOH, 5–10 μm tall. Hymenium hyaline, 50–60 μm tall, paraphyses simple, slightly thickened at the tip. Hypothecium hyaline, 50–90 μm thick. Ascospores simple, hyaline, 7.5–12.5 × 4.5–7.5 μm.

CHEMISTRY: atranorin, gangaleoidin.

SUBSTRATE: corticolous.

COMMENTS — This species is characterized by the corticolous, crustose thallus, yellowish brown apothecial discs, extremely crowded small apothecia, a coarse granular epihymenium, an amphithecium containing large crystals, and the presence of gangaleoidin. The morphologically similar *Lecanora cinereofusca* contains pannarin instead of gangaleoidin.

Lecanora cinereocarnea has been reported from Japan, the Philippines, and South America (Miyawaki 1988). New to China.

SPECIMENS EXAMINED: **CHINA. Gansu**: Wen Country, Qiujiaba, alt. 2500m, on bark, 4 Aug. 2006, X.L. Shi & F. Yang, 061992 (SDNU); Wen Country, Qiujiaba, alt. 2600m, on bark, 4 Aug. 2006, C.L. Wang & L. Lü, 062082 (SDNU); Wudu Country, Pandi Town, Tielugou, alt. 1500m, on bark, 7 Aug. 2006, X.L. Shi et al., 062473 (SDNU).

2. *Lecanora dispersogranulata* Szatala,
Annls hist.-nat. Mus. natn. hung., n.s. 7: 46 (1956) FIGURE 1B

Thallus yellowish white to yellow grey, thin to thick, rough, continuous to dispersed-verrucose, margin definite, prothallus absent. Apothecia sessile to constricted at the base, 0.6–1.3 mm in diam.; discs yellow to orange-brown, epruinose; margins concolorous with the thallus, thin, even to crenulate.

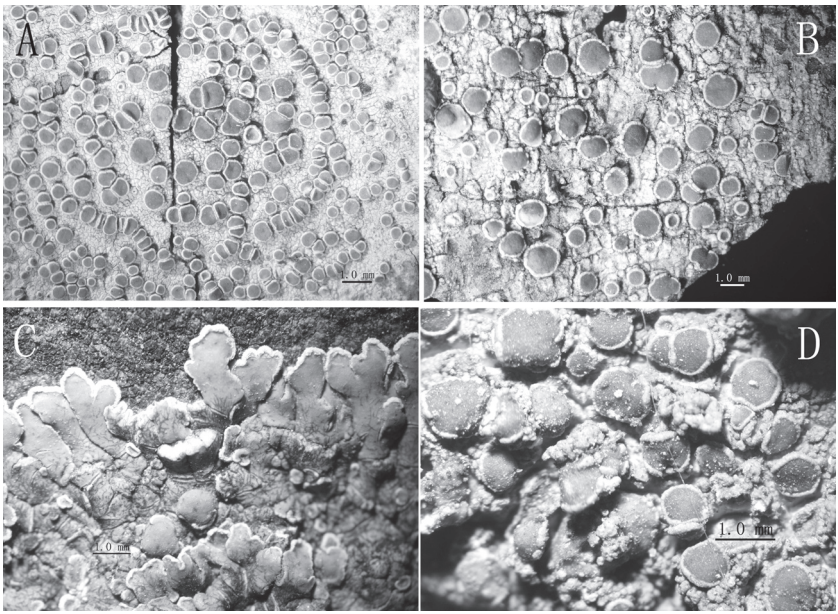

Figure 1. *Lecanora* species examined in the present study. Scale bar = 1 mm. A. *Lecanora cinereocarnea*, 062473 X.L. Shi et al. (SDNU); B. *Lecanora dispersogranulata*, 060996-2 F. Yang & X.L. Shi (SDNU); C. *Lecanora opiniconensis*, 20072799 F. Yang (SDNU); D. *Lecanora perflexuosa*, L397 Y.J. Li & W. Fu (SDNU)

Amphithecium: cortex distinct, 20–25 µm laterally, 25–35 µm at base, containing large crystals insoluble in KOH. Epihymenium yellowish brown, containing coarse granules, 12.5 µm tall. Hymenium hyaline, 55 µm tall, paraphyses slightly thickened apically. Hypothecium yellowish. Ascospores simple, hyaline, ellipsoid, 10–12.5 × 6.5–7.5 µm.

Chemistry: atranorin, 2′-O-methylperlatolic acid.

Substrate: corticolous.

Comments — The species is characterized by a corticolous, verruculose thallus, comparatively large apothecia that are constricted at the base, crenulate apothecial margins, and the presence of 2′-O-methylperlatolic acid. In containing 2′-O-methylperlatolic acid, our specimen resembles *L. helva,* but the latter has smaller apothecia and ascospores.

Lecanora dispersogranulata was described from New Guinea and also reported from Australia (Lumbsch et al. 2004). New to China.

Specimens examined: **CHINA. Gansu**: Zhouqu Country, huacaopoxigou, alt. 3300m, on wood, 29 Jul. 2006, F. Yang & X.L. Shi, 060996-2 (SDNU).

3. *Lecanora opiniconensis* Brodo, Mycotaxon 26: 309 (1986) FIGURE 1C

Thallus placodioid, areolate to squamulose, yellowish to grayish green; lobes plane, 0.8–1.5 mm wide, lobe tips usually becoming darker yellow or pale brown to orange, lightly pruinose; prothallus absent. Apothecia adnate, soon constricted, 0.5–2.0 mm in diam.; discs orangish yellow or yellowish brown, epruinose, plane to convex; margins concolorous with the thallus to pale green, slightly pruinose or not, entire, flexuous. Amphithecium: cortex hyaline, 25–50 μm thick, containing small crystals soluble in KOH. Epihymenium yellowish brown, with abundant fine granules, 12.5–15 μm tall. Hymenium hyaline, 45–50 μm tall. Hypothecium hyaline, 25–47.5(–100) μm thick. Ascospores simple, hyaline, 6–11 × 5–7 μm.

CHEMISTRY: usnic acid, placodiolic acid.

SUBSTRATE: saxicolous.

COMMENTS — This species is characterized by the saxicolous, squamulose thallus, darker yellow lobe tips, orangish brown apothecial discs, the fine granular epihymenium, and the presence of usnic acid and placodiolic acid. Other placodioid species of *Lecanora* (e.g., *L. muralis* and *L. polytropa*) can be easily distinguished from *L. opiniconensis* by anatomical features and chemistry.

Lecanora opiniconensis has been reported from North America and Asia (Ryan et al. 2004). New to China.

SPECIMENS EXAMINED: **CHINA. Shannxi**: Mt. Taibaishan, Fangyangsi, alt. 3300m, on rock, 4 Aug. 2005, C.L. Wang & F. Yang, TBW400 (SDNU); **Ningxia**: Mt. Helanshan, Suyukou, Toudaosong, alt. 2450m, on rock, 22 Aug. 2007, F. Yang, 20072799 (SDNU).

4. *Lecanora perflexuosa* (Räsänen) H. Miyaw., Journ. Hattori Bot. Lab. 64: 320 (1988) FIGURE 1D

Thallus whitish grey with green or yellowish white, moderately thick, areolate, continuous, smooth to slightly verrucose; cortex thin, 5–12.5 μm thick; prothallus absent. Apothecia abundant, generally crowded, sessile or slightly constricted at base, 0.3–2.3 mm in diam.; discs yellowish brown to reddish brown, epruinose, flat to slightly convex; margins concolorous with the thallus, usually thin, entire to flexuose, smooth to verruculose, occasionally crenate. Amphithecium: with small crystals insoluble in KOH, cortex hyaline, inspersed, indistinct. Epihymenium yellowish to reddish brown, without granules, 10 μm tall. Hymenium hyaline, 60–100 μm tall. Paraphyses slightly thickened. Hypothecium hyaline, 100 μm thick. Ascospores simple, hyaline, ellipsoid, 7.5–15.5 × 3.5–7.5 μm.

CHEMISTRY: atranorin, zeorin.

SUBSTRATE: corticolous.

Comments — This species is characterized by the corticolous, greenish gray thallus, egranular epihymenium, and the presence of zeorin. It is similar to *L. megalocheila* and *L. allophana*, but *L. megalocheila* has a granular epihymenium and *L. allophana* does not contain zeorin (Miyawaki 1988).

Lecanora perflexuosa has been reported from Japan and Korea (Miyawaki 1988). New to China.

Specimens examined: CHINA. Shannxi: Mt. Taibaishan, Zhongshansi, alt. 1650 m, on bark, 1 Aug. 2005, Y.J. Li & W. Fu L397 (SDNU); Ziyangtai, alt. 2300 m, 2 Aug. 2005, Y.J. Li & W. Fu L428 (SDNU).

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